(72) Inventors:
• Burg, Bernard
75015 Paris (FR)
• Robinson, William Neil
Weybourne, Farnham, Surrey GU9 9HH (GB)

(74) Representative: Kopacz, William James
83, Avenue Foch
75116 Paris (FR)

(54) **Terminal and method for accessing information services in a telecommunications network**

(57)   A telecommunications terminal (11) for accessing a plurality of services (such as e-commerce) in a telecommunications infrastructure (1,2,3) includes a selection facility (22) for choosing a list of actions from a store (21) appropriate to the type of service requested via an input (19) from the user. The invention provides a mobile terminal capable of performing local monitoring tasks and of executing remote tasks in the fixed infrastructure.

EP 1 041 831 A1

Description

[0001] This invention relates to telecommunications and in particular to a subscriber terminal and associated infrastructure for handling data and downloading information services to the terminal.

[0002] The advent of electronic commerce triggers new needs in the telecommunications field. One of the problems is to provide services to end-users without needing to update the infrastructure and without the necessity to put additional capabilities on every terminal.

[0003] EP-A-0685,972 discloses the addition of non-standard capabilities to GSM (Global System for Mobile Communications) mobile 'phones. These additional features are implemented into both the 'phone and the network infrastructure. However, this solution is inflexible in that it cannot accommodate any evolution in new services, some of which require down-loading into the 'phones. Further, it does not allow customisation of the 'phone and services to personal needs.

[0004] The present invention aims to provide a subscriber terminal and infrastructure capable of permitting dynamic loading and use of available telecommunications services.

[0005] According to a first aspect of the invention,

a telecommunications terminal for accessing an information service in a telecommunications network includes;
an input for detecting a request for an information service,
a store containing a plurality of action lists and threshold values,
means for making a comparison of the input with the stored threshold values,
means for selecting a stored action list depending upon said comparison, and means for transmitting a demand for execution of the action list to an associated telecommunications infrastructure and for receiving the information service in response to said demand.

[0006] According to a second aspect of the invention,
a method for assessing an information service in a telecommunications network includes the steps of;

at a subscriber terminal,
detecting a request input for an information service,
comparing a parameter of the request input with a stored value,
selecting an action list depending upon the comparison,
transmitting a demand for execution of the action list to an associated telecommunications infrastructure,
and receiving the information service in response to said demand.

[0007] The terminal may be a mobile phone such as a GSM phone.

[0008] The input may be a memory input such as a push-button or can be a measurement of temperature or acceleration, for example.

[0009] Communication between the terminal and the associated infrastructure may be performed by means of Agents, (to be defined below).

[0010] The information service may comprise down-loadable software code, in which case, the terminal is further provided with means for executing such code. A new action list may be created as a result and added to the store for future use.

[0011] By virtue of the provision of the store on-board the terminal, the resources of the terminal and infrastructure are optimised.

[0012] The invention also facilitates access via a mobile 'phone to Internet services.

[0013] The combination of the store with the selecting means provides a greater autonomy for the terminal which is capable of not only performing local monitoring tasks but also of executing remote tasks in a fixed infrastructure. This combination also facilitates co-operation between a mobile phone and the fixed infrastructure whereby tasks are shared.

[0014] Some embodiments of the invention will now be described, by way of example only, with reference to the drawings of which

FIG. 1 is a schematic diagram of a system constituting an embodiment of the invention;
FIG. 2 is a schematic block diagram of a subscriber terminal in accordance with the invention;
FIG. 3 is a flow diagram of a method for use with the system of FIG. 1; and
FIG. 4 is a flow diagram of an alternative method for use with the system of FIG. 1;

[0015] In Fig. 1, a telecommunications network, for example a GSM telephone network comprises a first cell 1, a second cell 2 and a third cell 3 respectively supported by a first base station 4 having a first Base Station Controller (BSC) 5 a second base station 6 having a second BSC 7 and a third base station 8 having a third BSC 9.

[0016] The first, second and third BSCs 5, 7, 9 are coupled to a Mobile Switching Centre 10 according to any method known in the art.

[0017] For the purposes of simplicity and clarity of description, the foregoing example will be described with reference to a single mobile terminal 11, for example a STARTAC® telephone manufactured by Motorola Limited, located within the first cell 1 and capable of communicating with the first base station 4. However, it should be appreciated that more than one mobile terminal can be provided, capable of operating in any of the first, second or third cells 1,2,3.

[0018] The mobile terminal 11 is capable of sending

a first agent 12, for example an intelligent software agent. The agent is an independent piece of mobile software code capable of migrating from one platform to another platform and is capable of controlling itself through an execution thread and can perform tasks of its own accord. The purpose of the agent is to transfer and receive information as well as execute tasks. The first agent 12 represents the mobile terminal 11 and is, for example, a Java™ applet.

[0019]   Pieces of existing software code can be encapsulated by or embedded in the first agent 12 and can be specific to the mobile terminal 11. It is thus possible to execute any kind of user-defined function on data gathered by the first agent 12 or provide services offered by existing service providers, for example, stock exchange fluctuation updates or bank account monitoring.

[0020]   The first, second and third BSCs 5, 7, 9 comprise a respective first, second and third host platform or Agent Meeting Place (AMP) 13, 14, 15 and a respective first, second and third fixed personalised response execution (PRE) facility 16, 17, 18. In this example, the AMP and PRE are located at the BSC. However, they can be located elsewhere, for example, at the Mobile Switching Centre (MSC).

[0021]   The first, second and third AMPs 13, 14, 15 are Agent Systems of the type described in Applicants co-pending application GB98400960 which can create, interrupt, execute and transfer agents. Examples of suitable agent systems are those defined by the Foundation for Intelligent Physical Agents (FIPA) and the Mobile Agent Facility Specification of the Object Management Group (MAF-OMG). Agent systems provide security functions, for example authentication and information confidentiality functions, such as data encryption.

[0022]   The first, second and third AMPs 13, 14, 15 are supported by a supporting platform, for example, UNIX or Windows NT running on a Personal Computer (PC) at each of the first, second and third BSCs 5, 7, 9. It should be noted that a given host platform can support more than one AMP.

[0023]   Typically the AMPs 13, 14, 15 comprise a yellow pages service, a white pages service, a unique naming service, a management system that controls the life-cycle and mobility of the first agent 12 and a transparent communications service. Optionally, the AMPs can provide a database facility to store data intended to stay on the AMP platform permanently, even after de-registration of the first agent 12. Communications between the yellow pages service, the white pages service, the management system the transparent communications service, or the database facility can be achieved by providing a respective agent for each of the services or facility. Alternatively, the yellow pages service, the white pages service, the management system, the transparent communications service, or the database facility can be a dedicated agent containing the data stored by the yellow pages service, the white pages service, the management system, the transparent communications service,

or the database facility, respectively. The yellow pages service is a service provided to any agent, by the first, second, or third AMP 13, 14, 15 for looking-up services provided by other agents residing locally at the respective AMP. The yellow pages service can optionally search all agent systems forming an agent community. The white pages service is a service which covers all agents which are currently resident on the AMP where the white pages service is located, i.e. locally, for determining the existence of another agent locally.

[0024]   The addresses of the first, second and third AMPs 13,14,15 can be, for example, a phone number or a TCP/IP address and can be known by means of the yellow pages service. A default AMP address is assigned to each agent in order to ensure an initial inter-agent communications can be set up. AMPs can communicate with other AMPs or other agent systems to exchange messages or agents via the transparent communications service.

[0025]   The first agent 12 executes an assigned task or mission as follows. The assigned task or mission can be a dialogue between the first agent 12 and any other agent residing at the first AMP 13 and/or a referral to the database facility of the first AMP 13. The communication protocol between agents is provided by the first AMP 13, as specified by FIPA Agent Communication Language (ACL). The assigned task can also be the execution of agent code on the first AMP 13, for example, the performance of functions, such as on data. The execution of agent code therefore allows functions to be carried out so as to manipulate the information or data gathered at the first AMP 13.

[0026]   When desired, information can be sent back to the mobile terminal 11. At any time whilst the first agent 12 resides at the first AMP 13, the first agent 12 can send messages to the mobile terminal 11. This information can be sent back via a Short Messaging Service (SMS). Also, at any time whilst the first agent 12 resides at the first AMP 13, a message can be sent to the first agent 12 from the mobile terminal 11 in order to update the first agent 12. This can be achieved via the toll-free number or by using the TCP/IP protocol as described above. The structure of the message is defined by various standards bodies, for example, FIPA or MAF-OMG, or by proprietary technology such as Aglets by IBM. The information to update the first agent 12 can be routed to the first agent 12 by means of addressing techniques known in the art, since the first agent 12 and any other agents resident at the first AMP 13 possess specific ID numbers associated with the agents assigned by the unique naming service as described above.

[0027]   With reference now to Fig. 2, incorporated in the mobile terminal 11, in addition to the first agent 12, there is also provided a sensory input 19, a triggering facility 20 a system constraint table 21 (SCT), a personalised response selection module 22 and a mobile personalised response execution (PRE) facility 23.

[0028]   In its general mode of operation, the mobile ter-

minal 11, detects activation of the sensory input 19 which triggers an action to select a personalised response based on individual needs or services. If the services can be provided by the mobile terminal 11, then the appropriate code is executed and the answer presented to the user. If the service is provided remotely, a message is transmitted to the Agent Meeting Place AMP 13.

[0029]   The AMP 13 finds the actions to be executed (for example, Internet access) and sends a message to the fixed PRE 16 to carry the actions out. The delivery of the result from the PRE 16 may be forwarded directly via a GSM link or via the AMP 13, with the possibility of intermediate processing and optimising the communications.

[0030]   Two embodiments of this invention are described in the following: the use of the non-standard services on a mobile terminal, and the download of such a service into the mobile terminal.

[0031]   In each embodiment, the transmission of messages between the mobile terminal and the AMP is by way of conventional message exchange, eg. SMS.

[0032]   Figure 3, shows the flow chart of the first embodiment i.e. when using a non-standard service.

[0033]   Steps 24-28 are carried out at the mobile terminal 11 and steps 29-31 are carried out by the fixed infrastructure comprising the AMP 13 and fixed PRE 16.

[0034]   The mobile terminal 11 detects sensory inputs (step 24). These inputs trigger an action (step 25) to select a personalised response based on individual needs or services stored in the System Constraint Table SCT 21. This function is carried out by the Personalised Response Selection PRS (step 26). The PRS sends the work to be executed to a Personalised Response Execution PRE and defines the way the messages are sent back from the fixed PRE (parameter Filter "Yes" or "No").

[0035]   If the PRE is local, the PRE function is executed on board the mobile terminal in step 27. The results are forwarded to the user in step 28.

[0036]   If the PRE is remote a message is sent to the Agent Meeting Place AMP via link A in SMS format. The AMP server searches for the services in its yellow pages (step 29). The PRE is executed by exchange of messages over link B with the AMP (step 30). The delivery of the result (step 31) may be forwarded directly by the PRE (with Filter parameter No) via link C or via the AMP with intermediate processing (with Filter parameter "Yes").

[0037]   The process embodied by the steps of Fig. 3 will now be described in greater detail.

[0038]   In step 24, an input is detected by the mobile terminal. This can be a pushed button, a measure such as temperature, acceleration, an input from a location device, an algorithm or location update function for example. This input sends a signal to the triggering function.

[0039]   Based on arrival of data, a threshold function is applied. The thresholds are set and adapted by each user and are stored in the System Constraint Table SCT. When an input data crosses the threshold, the Personalised Response Selection is triggered (step 25).

[0040]   Based on arrival of a signal from the triggering function, the PRS function selects the response according to two parameters:

the sensory input, and
the System Constraint Table (SCT) which contains information about the type of connection, its bandwidth, the processor capacity, the memory capacity for the mobile terminal, the preferences of the user, etc.

[0041]   The PRS analyses the sensory input to find the list of actions to be performed for each of them. In this preferred embodiment the SCT is used as a look-up table. Actions to be carried out are stored with possible executions schemes (local, remote, filtering etc.).

[0042]   The PRS selects the best strategy to carry the actions out, in regard to the SCT. To determine the local or remote execution of a task, the PRS makes the decision, according to the SCT parameters and the input given by the user. In the case of unknown services to provide, the PRS has to contact the AMP 13 via the GSM link.

[0043]   The execution of the action is sent to a Personalised Response Execution (PRE) which may be in the mobile terminal or remote. In the latter case, the PRS defines the communication parameters for the results transmission to the mobile terminal. The main communication parameter is called "Filter". If it is set to Yes, all the response messages flow from the fixed PRE to the AMP 13 which filters them and sends them to the mobile terminal 11. In the alternative case, with the filter parameter at No, the PRE sends directly the messages to the mobile terminal via the GSM link.

[0044]   If the PRS decides to perform the operations locally, the response execution is carried out autonomously by the PRE in the mobile terminal on reception of the list of actions.

[0045]   Subsequently, the results are delivered directly to the user.

[0046]   If the PRS decides to perform the operations remotely, a message is sent via the GSM link to the AMP 13, whereupon the AMP can either carry the work out, or sub-contract it to the fixed PRE, since both AMP and PRE are agent platforms.

[0047]   The results of the fixed PRE are encoded into messages and are either: sent directly to the mobile terminal with Filter parameter "No", or routed through the AMP 12; with Filter parameter "Yes". In this latter case any filter function can be used at the AMP 13 to gather the messages and filter them, in order to reduce the volume of the data to be transmitted. One example is to provide a default mechanism grouping all the messages before sending them.

[0048]   Sending directly to the mobile terminal is pre-

ferred for time- constrained problems with small amounts of transmitted data, whereas routing through the AMP 13 permits local processing and optimisation of the cost and bandwidth of the telecommunication link.

[0049] Fig. 4 illustrates the steps of a second embodiment loading a non-standard service to the mobile terminal 11, thereby allowing the mobile terminal to run its own on-board PRE 23 (see Fig. 2).

[0050] At the sensory input step 32, a special keyword is used for the download protocol.

[0051] At the step 33, the download operation is known by the SCT which gives the course of actions to follow.

[0052] At step 34, the PRS sends a "load" message to the AMP 13 located within the fixed infrastructure .

[0053] At step 35, the load message is treated in the AMP 13 which looks for the mobile agent fulfilling the service to load. These services are downloaded to the PRE by using the mobility of mobile agents. A preferred embodiment is a FIPA agent platform utilising Java.

[0054] At step 36, when updating the Mobile terminals PRE 22 the content of the SCT 21 is also updated with the name of the added service and the corresponding set of actions.

[0055] Two further examples of the use to which the invention can be put follow herebelow.

[0056] In example 1, a patient has gone through cardio-vascular surgery. After he is discharged from hospital, his condition is monitored and in the event of complications, the surgeons are ready to provide the required emergency service. To do so, an electrode measures the heart beats and enters them into the mobile phone 11 of Fig. 1. The phone provides two functions: it monitors the patient's heartbeats and dials the hospital if predetermined thresholds are exceeded. The alert algorithm performs as follows:

if heartbeat < threshold 1; no action
if threshold 1 < heartbeat < threshold 2: alert the patient of high heartbeat, advice on mediation, things to do and to avoid,
if heartbeat > threshold 2: alert patient of critical condition, send message to the emergency crew of the hospital, send heartbeat samples for advanced diagnosis.

[0057] To realise this function on the phone, it is necessary to download the heart monitoring service into the phone. In a second phase, this service can be used to monitor the patient's health on a local control loop. Phone transmissions will only be used in case of emergency.

[0058] In order to download of the heart monitoring service, the hospital develops or purchases a heart monitoring service, and loads it into the phone of the patient. It has just to initially enter the following data.

definition of the port receiving the electrode input,

definition of the heart monitoring service to be loaded,
definition of threshold 1 and threshold 2.

[0059] All the software load operations are carried out automatically. The relevant AMP then sends it to the on-board PRE. The SCT is updated and gives the sequence of actions to follow for the heart monitoring service, as well as the two thresholds.

[0060] The service works as follows:

Step 1: Sensory Input
The heartbeats are sampled.
Step 2: Triggering Function
If heartbeat < threshold 1, no function is triggered, go to step 1.
Step 3: Personalised Response Selection (PRS) Function
If heartbeat < threshold 2

then alert the patient of high heartbeat, advice on medication, things to do and to avoid, go to steps 4,5.
else alert patient of critical condition, send message to the emergency crew of the hospital, send heartbeat samples for advanced diagnosis, go to steps 6, 7, 8 below.

Step 4: Local Personalised Response Execution (PRE)
Display the alert message to the patient, perform additional functions for advice, and calculation of relevant parameters.
Step 5: Delivery of Results
Via screen and beeper on board the phone
Step 6: Remote Agent Meeting Place (AMP)
If heartbeat > threshold 2 send message to the emergency crew of the hospital, send heartbeat samples for advance diagnosis
Step 7: Remote Personalised Response Execution (PRE)
Emergency crew automatically notified.
Step 8: Filter
Inform patient of emergency team progress which is delivered through step 5. Preferably the messages are not filtered in the healthcare system when dealing with an emergency.

[0061] In example 2, consider a simple e-commerce information transaction. The user wants to know where to buy a book, when he can get it, and the price. Firstly, he has to consult the yellow pages to find addresses of bookstores. Then the book's description is sent to several shops to find the best deal, considering price and deadlines.

[0062] In this example no software is downloaded to the 'phone.

[0063] This service works as follows:

Step 1: Sensory Input

The user chooses the purchase service for books.

Step 2: Triggering Function

As this service is not resident on the phone, it triggers the appropriate PRS function.

Step 3: Personalised Response Selection (PRS) Function

A request is sent to the Agent Meeting Place,

If this service is known in the SCT the sequence of actions to connect to a bookstore is sent to the AMP. Otherwise, the PRS sends a message to the yellow pages of the AMP. Steps 4 and 5 of example are not executed in this scenario since all processing has to be accessed remotely.

Step 6: Remote Agent Meeting Place (AMP)

If requested, the AMP searches in its yellow pages for bookstores.

In any case the output of the AMP is a sequence of actions to be carried out by the PRE.

Step 7: Remote Personalised Response Execution (PRE)

Finds the book in different bookstores, asks for price, deadlines and the payment facilities.

Step 8: Filter

If the filter parameter is yes, all the purchase opportunities are gathered and send back as unique message.

[0064] Now the user has the list of purchase on his phone. To complete the e-commerce transaction, the user has to choose the preferred solution, send a purchase order to the bookstore and give the debit order to his bank. Once the bank has fulfilled the transaction, the bookstore is credited and the book is bought.

Claims

1. A telecommunications terminal (11) for accessing an information service in a telecommunications network (1,2,3),
   the terminal (11) including,

   an input (19) for detecting a request for an information service,
   a store (21) containing a plurality of action lists and threshold values,
   means (20) for making a comparison of the input with the stored threshold values,
   means (22) for selecting a stored action list depending upon said comparison, and
   means (12) for transmitting a demand for execution of the action list to an associated telecommunications infrastructure and for receiving the information service in response to said demand.

2. A telecommunications terminal (11) as claimed in claim 1 in which said terminal comprises a mobile telephone.

3. A telecommunications terminal (11) as claimed in either preceding claim in which the means for transmitting a demand and for receiving the information service includes an Agent (12).

4. A telecommunications terminal (11) as claimed in any preceding claim in which the received information service includes software code and in which the terminal (11) further includes means (19) for executing said software code.

5. A method for accessing an information service in a telecommunications network including the steps of;

   at a subscriber terminal (11),
   detecting (24) a request input for an information service,
   comparing (25) a parameter of the request input with a stored value,
   selecting (26) an action list depending upon the comparison,
   transmitting (29) a demand for execution of the action list to an associated telecommunications infrastructure,
   and receiving (31) the information service in response to said demand.

6. A method according to claim 5 and further including the step of creating a new action list in response to the information service received.

7. A telecommunications infrastructure (1,2,3) including means (13) for receiving a demand for execution of an action list transmitted by a subscriber terminal (11) in accordance with the method of claim 5 or Claim 6.

8. A telecommunications infrastructure (1,2,3) according to claim 7 in which the means for receiving a demand includes an Agent Meeting Place (13).

9. A telecommunications infrastructure (1,2,3) according to claim 7 or claim 8 and further including means (13) for transmitting to a subscriber terminal (11) an information service in response to said demand.

10. A telecommunications infrastructure (1,2,3) according to claim 9 in which the means (13) for transmitting an information service includes Agent Meeting Place (13).

11. A telecommunications infrastructure (1,2,3) according to either of Claims 9 or 10 in which the information service comprises down-loadable software

code.

12. A telecommunication infrastructure (1,2,3) according to any of claims 7 to 11 and further including means (16) for executing the action list.

13. A method for accessing an information service in a telecommunications network (1,2,3) including the steps of:

    detecting (24) a request input for an information service;
    comparing (25) a parameter of the request input with a stored value;
    selecting (26) an action list depending upon the comparison;
    transmitting (29) a demand for execution of the action list;
    receiving (29) said demand;
    executing (30) the action list;
    transmitting (31) the information service in response to the demand;
    and receiving (31) the information service.

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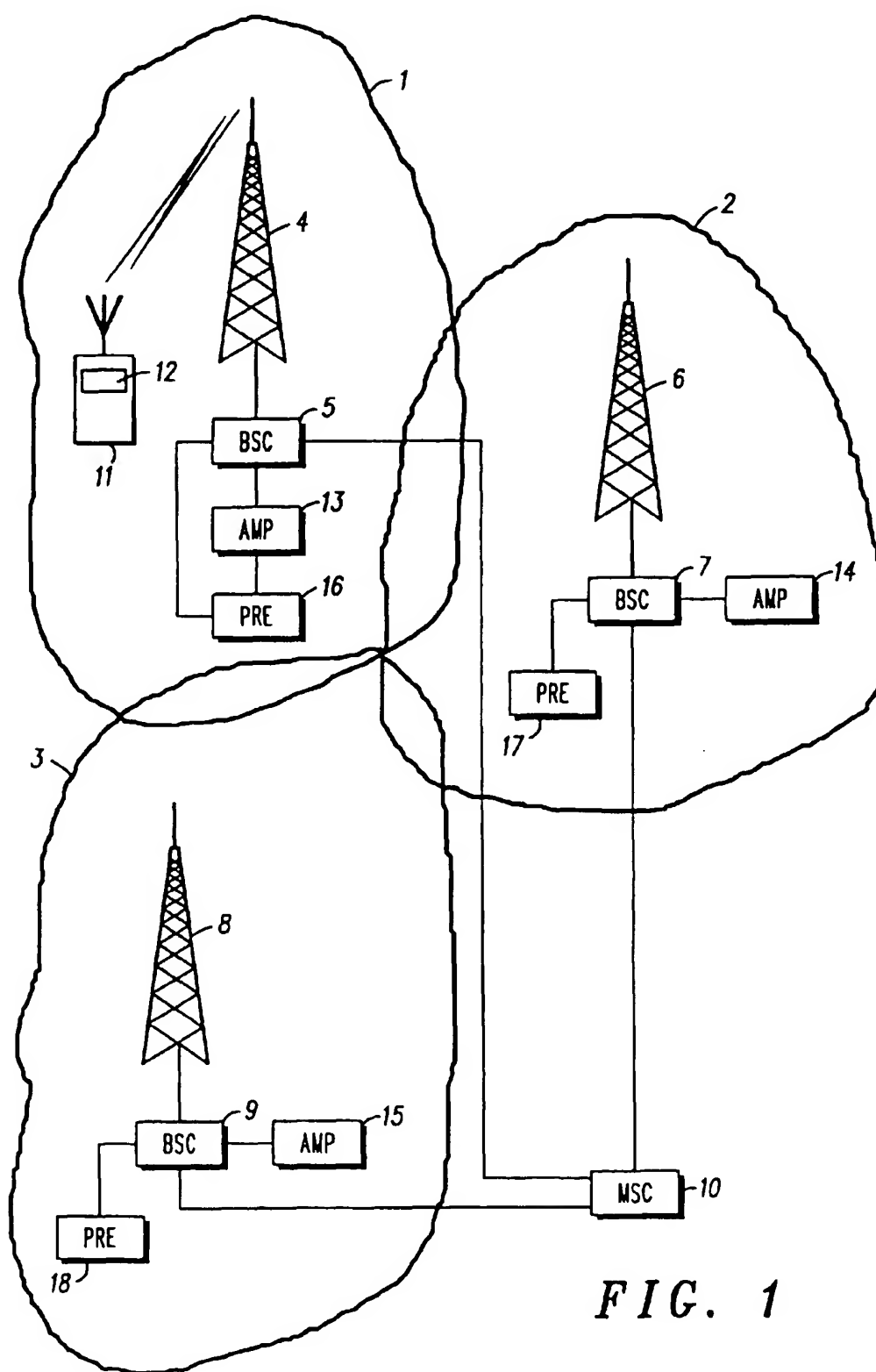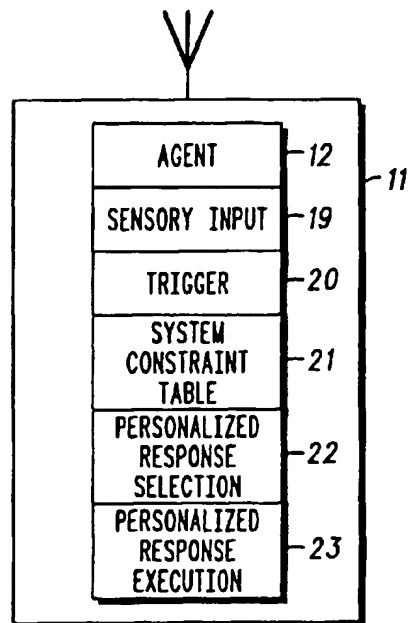
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FIG. 1

FIG. 2

FIG. 3
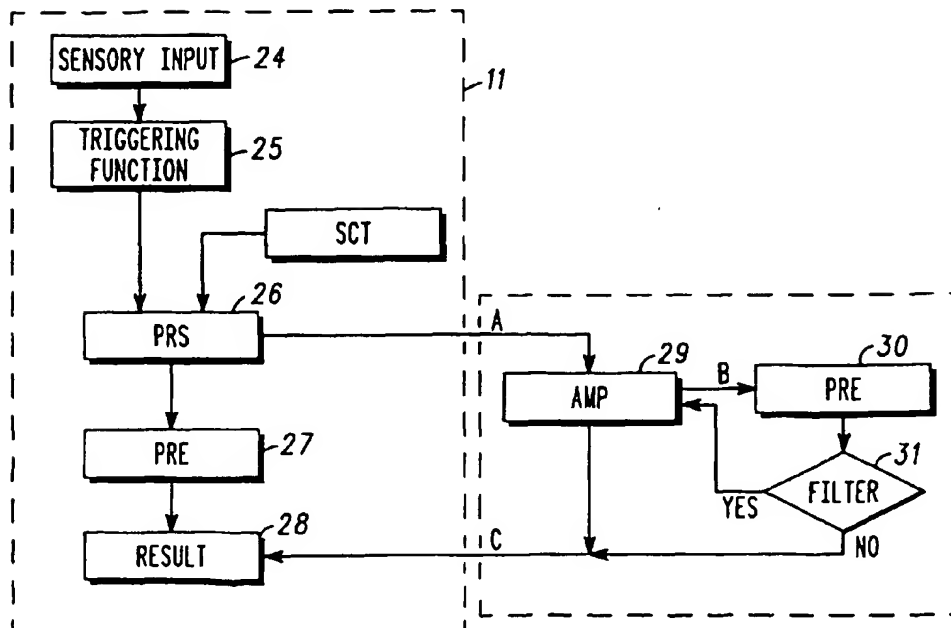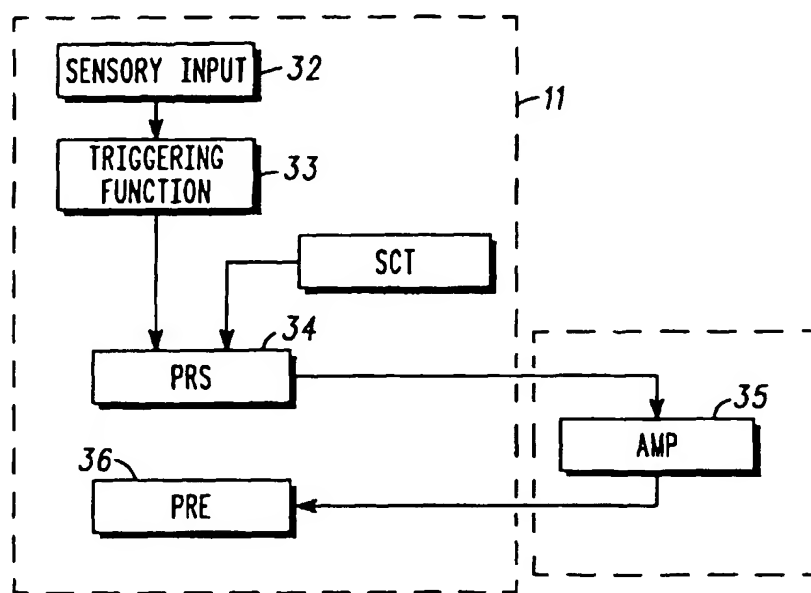
FIG. 4

<table>
<tr><td></td><td colspan="2">EUROPEAN SEARCH REPORT</td><td colspan="2">Application Number
EP 99 40 0773</td></tr>
</table>

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The present search report has been drawn up for all claims	

Place of search	Date of completion of the search	Examiner
THE HAGUE	31 August 1999	Schut, G

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**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**   EP 99 40 0773

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
The members are as contained in the European Patent Office EDP file on
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